Over arthroplastiek met metalen endoprothese bij verse dijhalsbreuk (naar aanleiding van 71 behandelde patienten)

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SUMMARY

Fracture of the neck of the femur in the elderly remains a controversial subject. The first chapter of this thesis deals with the epidemiological aspect, and illustrates the importance of this fracture with an annual incidence of 4000 (in a population of 12.000.000) and an annual mortality of 1100. The cumulative risk to a person of 85 years of age, who sustains this fracture, is more than 10 %.

There is a general dissatisfaction with the customary treatment by osteosynthesis because of its high failure rate and prolonged need of immobilisation.

In the last two decades arthroplasty of the hip with vitallium endoprosthesis has gained ground as an alternative for osteosynthesis in the treatment of recent fractures of neck of femur. Although first reports have been favourable in regard to arthroplasty, criticism has been heard with respect to the long term results. The indications for this form of treatment have not yet been settled.

The follow-up findings in 71 operated patients form the basis of this thesis.

The ultimate fate of the head of the femur after a fracture depends largely on the remaining vascular supply. Hitherto all efforts to measure the vascular damage have not led to practical results. The arrangements of the bony trabeculae however can give a rough impression of the vascular damage to be expected.

Basic information about these important features of functional anatomy (vascular supply and bone architecture) are reviewed in Chapter II.

In the repair of fractures of neck of femur by osteosynthesis, as well as in the design and functioning of the prosthesis, the forces acting on the hip in various forms of activity should be considered.

Therefore in Chapter III aspects of the biomechanics of the hip joint are discussed. Although the movements of the different parts of the body during normal walking seem all to be directed to reducing the deviations of the centre of gravity of the body, the metabolic energy requirements for the vertical displacement of this centre still take up approximately 80 % of the energy expended in walking.

The phasic activity of the muscles around the hip joint which provide this energy, as registered by electromyography, is mentioned. The magnitude and the direction of the forces acting on the hip joint have been calculated theoretically and confirmed experimentally. This has been accomplished indirectly by measurement of the pull of the abductor muscles, and in vivo with the aid of the prosthesis itself as a means of measurement, a method developed in Sweden.

The exact mechanism of fracture of the femoral neck is not yet known. It is a remarkable fact that these fractures are hard to reproduce under laboratory conditions. Some attention is paid to the theories in regard to aetiology of fracture of the neck of the femur. Whatever the theories on fracture mechanism may be, the patient has to be treated in one of two ways.

The possibilities of treatment, conservative and operative, are discussed in Chapter IV. Conservative therapy finds its only indications in the abduction type of fracture and in patients who are in a generally bad condition. The operative treatment by osteosynthesis is not always followed by an eventual restoration of the proximal end of the femur. The Garden classification of pre- and peroperative Röntgen findings is useful in predicting the outcome of ostesynthetic procedures. There is no direct evidence that other osteosynthesis-devices have an advantage over the Smith Petersen nail.

The osteosynthesis combined with pediculated bone graft, as developed by Judet, is a major operation. A conclusive opinion with regard to the indications for its use cannot yet be formed.

Arthroplasty with vitallium endoprosthesis has gained popularity as the operation of choice in the elderly. The relatively large number of arthroplasties carried out for recent femoral neck fractures in the Municipal Hospitals in the Hague (Holland) has been surveyed.

In Chapter V the material and methods of the investigation are given. In the period 1959–1965 180 patients with femoral neck fractures were seen. 61 patients were treated by osteosynthesis, 71 by arthroplasty, 27 by a balanced traction frame for impacted abduction fracture and 21 (12 %) only were not considered fit for an operation because of their bad general condition.

The 71 patients, on whom arthroplasty of the hip was performed, showed the usual preponderance of females; ratio of women-men is 3 : 1. The mean age was 76,6 years.

In 59 cases the age factor determined the use of arthroplasty. Originally an age limit of 75 years was chosen; lateron this was lowered to 70. Of the other 12 patients who underwent operation the reasons ranged from (1) failure of reduction, (2) neglected fracture, to (3) neurological and psychiatric conditions and (4) the patient's own request.

The operation was not considered as an emergency, but was carried out after extensive investigation.

The hip joint was approached by a Southern approach and a Moore, Thompson or Eicher prosthesis inserted. At the end of 2 weeks full weight-bearing was resumed. Rehabilitation was carried out either in the hospital or in a rehabilitation unit.

The results in 71 patients, who were treated with an arthroplasty, are set out in Chapter VI. The patients who died in hospital comprised 14 % (10 patients), a further nine patients (12 %) died in the first year. After the first postoperative year the annual mortality was 3 patients. Our findings are in agreement with those of others, that in the first post-operative year the mortality is higher than can be expected in a comparative age group of the population.

It was to be expected that many other pathological conditions would be found in patients of this age group, and this suspicion proved to be correct. Thus, it was found necessary to institute some form of preoperative treatment on twelve occasions; on two occasions only could this therapy be said to be effective in saving life. On the other hand, the delay in carrying out operative surgery was responsible for a number of other complications (36 in 29 patients).

Important operative complications have been few. 77 post-operative complications developed however in 40 patients.

Prophylactic anticoagulants prevented thrombosis and embolism to a gratifying extent.

Of the post-operative complications bedsores were a major problem. Lesions of the sciatic nerve occurred in three cases, but subclinical nerve lesions were probably more frequent.

Wound infection was found in ten cases (14 %), in two of which the infection proved to be subfascial.

At the time of investigation, 40 of the 71 patients were still alive. Evaluation of the results of these cases is presented following the schema of Shepherd and Merle d'Aubigné. A proposition is made to overcome certain drawbacks inherent to these methods by the introduction of a new method of classification, more adapted to the evaluation of end results in recent fractures of neck of femur in old people.

The end results, by Shepherd's method in 40 patients would be as follows: 10 Excellent, 7 Good, 14 Fair and 9 Poor.

The outpatient follow-up appeared not to have been as thorough as was thought. One of the most striking features of the investigation was the change that was brought into the mode of living and the social lives of the patients by this injury. 12 of 61 patients leaving the hospital alive lost their previous independence.

Of the surviving 40 patients only 16 appeared to have a normal gait on clinical

examination. It should be mentioned here that no mechanical registration of the walking pattern was carried out. This refinement of mensuration in other studies has shown a diminished load per unit time of the affected limb, even with a gait that appeared clinically normal.

The wide variation in clinical results gave rise to the question whether certain clinical conditions affected the outcome of the arthroplastics. A smooth post-operative mobilisation was an indication of a good long term result, but it was not a guarantee thereof. Only half of the patients with a smooth post-operative mobilisation reached a good long term result.

Another point of interest is the, often found, changed anatomy of the hip after arthroplasty. It is virtually impossible to reconstruct the proximal end of the femur to its previous anatomy. The anteversion of the neck for instance cannot be maintained by an ordinary prosthesis. The result is a relative outward rotation of the affected limb. This outward rotation has been said to give rise to various complaints in the upper part of the leg and hip; however it has not been possible to establish any connection between outward rotation of the operated limb and the end results.

Although difference in length of the leg may influence walking patterns, it was not possible to confirm any connection between shortening of the leg and the end result. Also the age was not of major significance in the long term results, but concomitant diseases were.

The durability of a good result after arthroplasty is of the utmost importance if its use in younger patients is considered. Owing to lack of regular follow-up and the high mean age of the patients we have no clear-cut picture of the changes in time. In 1 patient (6 years after operation) a big deterioration in function was noticeable. There appeared to be no obvious reason for this.

The component factors of the classification of Shepherd are not of equal value in the determination of the end result. The mobility of the hip proved to be useless as a parameter.

The functional activity was the most limiting factor. The classifications of Shepherd and Merle d'Aubigné were generally in agreement, but there was a considerable overlapping in the grouping of the end results.

Chapter VII gives an account of the X-ray findings. In most of the papers on the subject of arthroplasty, these findings are not mentioned to any great extent and, it must be admitted, they are difficult to interpret.

Standard X-ray photographs, essential for comparison, are discussed.

In the absence of weight-bearing the prosthesis seems to be accepted by the body as an inert mass. Only periarticular calcifications can be found in the non-bearing hip, probably caused by operative trauma. As soon as weight-bearing is resumed however, a line of demarcation between prosthesis and bone develops. This loosening of the prosthesis can progress in some cases to a considerable degree. Rotation and tilting patterns can be distinguished.

In the material available protrusio acetabuli, signum mali ominis, was encountered on two occasions.

Periarticular calcification seems to have no direct bearing on the end results of arthroplasty.

With passage of time the prosthesis sinks into the femur. The rate at which this occurs differs considerably from one patient to another and is probably the sum of the degree of osteoporosis, mechanical relations, build of prosthesis and time of weight-bearing.

Atrophy of bone in the femoral cortex after arthroplasty was a common finding. Although disuse atrophy could be the cause, some features strongly resemble post-traumatic dystrophy.

The role of the changed intra-osseal pattern of weight-bearing and pressure divisions is questioned.

More information concerning bone histology and chemistry after arthroplasty would be welcome to establish the true nature of the X-ray findings.

Osteomyelitis by infection around the prosthesis can escape diagnosis for a long time. In our one patient with this complication it took 3 months before convincing X-ray signs became visible.

An approximate measurement of the antoversion or retroversion of the prosthesis can be derived from a single X-ray of the hip in the Moore prosthesis, thanks to the known size of the prosthesis and its particular shape. The types of prosthesis that were used (Eicher, Thompson, Moore) all have their theoretical advantages and disadvantages. The numbers were too small to come to a conclusion on any difference in the clinical results. Of the three prostheses mentioned, Thompson's seems to be the nearest approach to the ideal.

The last Chapter, VIII, deals with the decision when to operate and which operation to choose, osteosynthesis or arthroplasty, in the individual patient.

In the writer's opinion an operation for femoral neck fracture has to be considered as an emergency, whatever operative procedure is decided upon. The vascularity of the head of the femur is seriously endangered by the dislocation. The general condition of the patient tends to become worse in a short time. 36 complications were seen to develop in the interval between fracture and operation. The advantage gained by an extensive pre-operative examination on the other hand is small. Indications for arthroplasty in preference to osteosynthesis as mentioned in literature are: advanced age, "vital indication", early mobilisation, early weight-bearing, shorter hospitalisation, type of fracture, failed reduction, neglected fracture, consistency of the results, small claim to hip function in the elderly and associated diseases influencing mobility.

Scrutinizing each of these indications it appears that almost none stands up to criticism.

The writer considers that the mediocre results found in the patients do not warrant the routine performance of arthroplasty in the elderly.

In selected cases however an endoprosthesis can be the best solution.

Advocated indications are: (1) very short life expectancy (malignancies), (2) grave psychical disturbances; and, relative indications: (3) serious dislocation of the fracture, (4) failed reduction, (5) neglected fracture, (6) serious arthrosis of the hip or (7) paralysis of the affected limb.

Selection of patients has proved to be the method of choice in the treatment of fractures of neck of femur.

It is to be expected that centralisation of the patients with femoral neck fracture will improve the care that can be given to them and make surgical treatment more effective.